Effectiveness of De-Snaring Strategies in Protecting Tanzania's Wildlife at Serengeti National Park

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Abstract

This study evaluates the effectiveness of de-snaring as an anti-poaching strategy in Serengeti National Park (SENAPA), focusing on poaching techniques, community perceptions, and operational challenges. The study involved 67 respondents, including SENAPA staff, former poachers, and village leaders, selected through purposive and stratified random sampling. Findings revealed that snaring is the most common poaching method, followed by shooting, trapping, and water poisoning, all threatening biodiversity. Community perceptions showed 59.7% believe poaching has declined over the past five years due to enhanced patrolling and de-snaring. Despite progress, challenges like limited resources, vast park coverage, and insufficient funding hinder effectiveness. Awareness of de-snaring efforts was high (74.6%), with 75% rating cooperation as excellent or good, though 25.4% were unaware of these initiatives. The study recommends strengthening community involvement through education, training, and participatory conservation programs. Increased government funding, stricter anti-poaching laws, and advanced surveillance technologies are essential. SENAPA should focus on capacity building, targeted resource allocation, and improved monitoring. Sustained, collaborative approaches are crucial to preserving Serengeti National Park's ecological integrity.

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1. Introduction

Wildlife poaching and trafficking are pervasive global problems that pose a serious threat to biodiversity and ecological balance (Haas & Ferreira, 2018; Harrison et al., 2015). These illegal activities extend beyond conservation concerns and have profound social, economic, and cultural implications, especially for communities that rely on wildlife-based tourism and natural resources for their livelihoods (Dimoso & Andrew, 2021; Knapp et al., 2017). The consequences of poaching are severe, leading to significant population declines among numerous species, with some animals even facing local extinction in areas where poaching is rampant (Chase et al., 2018; Agence Nationale des Parcs Nationaux, 2019). These declines disrupt ecosystems where each species plays a crucial role in maintaining ecological balance. Addressing poaching requires a multifaceted approach, integrating conservation biology, law enforcement, community engagement, and international policy (Duffy et al., 2019; Cheteni et al., 2018). Despite ongoing efforts, there remain significant gaps in the effectiveness and reach of these strategies, particularly in regions where resources and enforcement capabilities are limited (Kitole & Sesabo, 2024).

In Africa, the economic losses caused by poaching are considerable. Wildlife tourism, a major revenue source for many countries, has been severely impacted by the decline of iconic species such as elephants and rhinos (Jones & Barnes, 2006; WWF, 2019). For instance, in East and Southern Africa, elephant poaching alone has resulted in an estimated annual revenue loss of $25 million in the tourism sector (WWF, 2019). Beyond the financial repercussions, poaching disrupts the livelihoods of local communities and often leads to conflicts with conservation authorities (Henk, 2018; Abere & Opara, 2019). In response, nations and international organizations have implemented various strategies, including increasing ranger patrols, deploying advanced surveillance technologies such as drones and satellite imagery, and building local capacity for wildlife management and conservation (SADC, 2019; Department of Wildlife and National Parks, 2020). However, these measures have not completely eliminated poaching, indicating persistent gaps in resources, enforcement, and community involvement (Kideghesho et al., 2020).

Globally, the illegal wildlife trade is one of the most lucrative forms of illicit trafficking, with estimates of its annual value ranging between $5 billion and $20 billion (Lawson et al., 2018; Bowen, 2018). Driven by high demand for products such as ivory, rhino horn, and bushmeat, this trade extends beyond Africa and Asia, affecting regions like North America, where poaching has historically caused significant declines in species such as grizzly bears, bighorn sheep, and walruses (Parker & Wolok, 2019). This global nature of wildlife trafficking underscores the need for coordinated international efforts to address the crisis (Duffy et al., 2016). Despite international agreements and policies, such as CITES (Convention on International Trade in Endangered Species), poaching networks remain highly organized and adaptive, exploiting gaps in enforcement and governance (Cheteni et al., 2018; Kitole & Genda, 2024).

In Tanzania, poaching continues to be a significant threat despite the establishment of extensive protected areas, including national parks, game reserves, and wildlife management areas (Kideghesho et al., 2020). Methods employed by poachers have evolved from rudimentary tools to sophisticated techniques involving automatic weapons and poisoning of water sources (Walker, 2018; Thornycroft & Laing, 2019). Snaring, in particular, remains a prevalent and indiscriminate method that not only targets specific species but also harms non-target animals, exacerbating the conservation crisis (Hamisi, 2019; Kitole et al., 2023). While collaborative efforts by organizations

such as the Serengeti National Parks Authority (SENAPA) and non-governmental organizations have made some progress, challenges such as limited resources, inadequate enforcement, and the sheer scale of protected areas hinder effective anti-poaching measures (Haas & Ferreira, 2018).

To effectively combat poaching and wildlife trafficking, strategies must evolve to address these gaps. Technological advancements, such as artificial intelligence, real-time monitoring systems, and community-driven conservation programs, offer promising solutions (Duffy et al., 2019; Creswell, 2018). However, addressing the root causes of poaching, including poverty, lack of alternative livelihoods, and social dynamics that drive poaching activities, is crucial (Kahler & Gore, 2012; Kitole & Utouh, 2023). Long-term success in protecting wildlife will require a global commitment to conservation, sustainable development, and stronger enforcement of international agreements (Henk, 2018; Kideghesho et al., 2020). Without addressing these underlying gaps, poaching will continue to threaten the rich biodiversity of regions like the Serengeti, with irreversible consequences for ecosystems and the communities that depend on them.

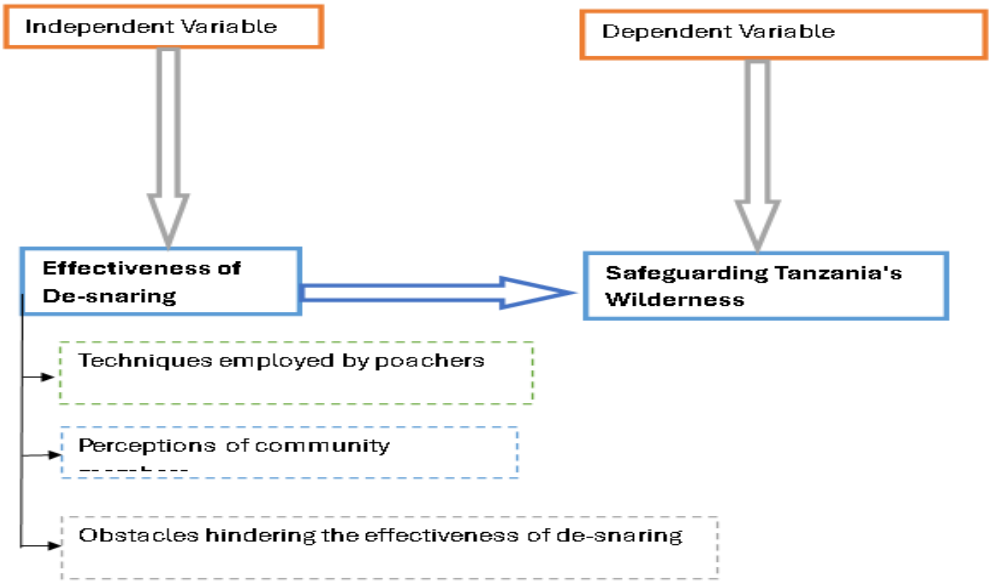
2. Theoretical underpinning

To address poaching in the Serengeti and evaluate the effectiveness of anti-poaching strategies, the integration of Neutralization Theory and Routine Activities Theory provides valuable insights into the behaviors and patterns associated with poaching. These theories offer a comprehensive framework for understanding the psychological, social, and situational factors that facilitate poaching activities and help shape targeted interventions to reduce them effectively. Neutralization Theory explains the psychological and social justifications that poachers use to rationalize their illegal activities. Poachers may minimize personal responsibility by attributing their actions to community pressures or familial expectations. This rationale underscores the importance of designing community outreach and education programs that address social norms and peer influences. Additionally, some poachers downplay the harm caused by their activities, arguing that poaching is less detrimental than other crimes. Conservation campaigns can counter this mindset by highlighting the ecological damage and economic impacts on wildlife and local communities. Another common justification involves socio-economic hardship, where poachers perceive poaching as a necessary means of survival due to poverty or lack of opportunity. Anti-poaching strategies, therefore, need to focus on providing alternative livelihoods and economic support to mitigate these perceived necessities. Furthermore, distrust toward law enforcement or conservation authorities can lead poachers to deflect criticism by accusing these bodies of hypocrisy or ulterior motives. Building trust through transparency, consistent enforcement, and community engagement is essential for addressing this form of rationalization.

Routine Activities Theory focuses on the situational factors that facilitate poaching, proposing that crimes occur when a motivated offender encounters a suitable target without adequate protection. Understanding these situational dynamics is crucial for developing effective anti-poaching strategies. Motivations for poaching can vary, including economic gain, subsistence, or thrill-seeking, and addressing these motivations through targeted interventions, such as economic incentives or alternative income opportunities, can reduce the prevalence of poaching. The wildlife in the Serengeti represents suitable targets for poachers, and efforts to reduce the attractiveness or accessibility of these targets are necessary. This includes increasing patrols, deploying surveillance technologies like drones and camera traps, and physically protecting wildlife through improved monitoring and response systems.

Furthermore, Routine Activities Theory emphasizes the importance of guardianship in preventing poaching. Poaching often occurs in areas with insufficient surveillance or weak enforcement. Enhancing ranger presence, improving law enforcement coordination, and involving local communities as guardians through community-based conservation programs can significantly improve protection. When communities are engaged and empowered to act as stewards of wildlife, the chances of detecting and preventing poaching increase. These efforts not only strengthen conservation outcomes but also promote a sense of shared responsibility among local populations, making anti-poaching measures more sustainable. The integration of Neutralization Theory and Routine Activities Theory offers a dual approach to tackling poaching in the Serengeti. Neutralization Theory provides insights into the psychological and social justifications that need to be addressed through education, community engagement, and the alignment of conservation efforts with local customs. Meanwhile, Routine Activities Theory highlights the need to modify situational factors by reducing opportunities for poaching through better surveillance, enforcement, and community-based protection. Together, these theories form a robust framework for understanding and addressing the multifaceted challenges faced by de-snaring and other anti-poaching strategies in Serengeti National Park.

Figure 1: Conceptual Framework



Source: Author's design (2024)

3. Methodology

The study employed a positivist philosophy, which emphasizes the use of empirical scientific evidence, controlled experiments, and statistical analysis to understand societal phenomena. Positivism is grounded in the idea that research should be limited to observable and measurable phenomena. This philosophical framework allowed the study to maintain a rigorous methodology by formulating hypotheses, conducting empirical tests, analyzing results, and codifying findings

into generalizable conclusions (Kothari, 2020). The approach provided a structured and objective basis for investigating poaching activities and the effectiveness of anti-poaching measures.

To ensure a comprehensive understanding of the research problem, the study utilized a mixed-methods approach, integrating both qualitative and quantitative techniques. The qualitative methods included interviews, focus groups, and content analysis, which provided in-depth insights into the social, cultural, and behavioral aspects of poaching and anti-poaching strategies (Creswell, 2018). These methods explored the attitudes, experiences, and beliefs of different stakeholders, uncovering the complexities and nuances of human interactions with wildlife conservation efforts. The quantitative component involved numerical data collection through surveys, structured observations, and experiments, offering a broader perspective on the research problem. By quantifying trends and patterns, this approach facilitated the generalization of findings to a larger population, complementing the qualitative insights.

The study's descriptive research design allowed for a systematic examination of the current state of poaching-related phenomena and the relationships between various variables. Data was gathered from three distinct population groups: 35 SENAPA staff members involved in anti-poaching efforts, 25 former poachers, and 20 village leaders and elders from communities near SENAPA, making a total of 80 respondents (SENAPA, 2023). The sample selection employed a combination of purposive sampling for non-probability methods and stratified random sampling for probability methods. Data analysis used both qualitative and quantitative approaches. Qualitative data from interviews was coded and categorized into themes aligned with the research objectives, while quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS), version 24. The results were presented in the form of frequencies, tables, percentages, and interpreted using means and standard deviations. This mixed-methods approach ensured the validity and reliability of the findings through triangulation, providing a balanced and in-depth understanding of the research problem.

4. Results

Demographic information of respondents

The gender distribution of respondents reveals a notable gender imbalance. Of the 67 respondents, 59.7% were male, while 37.3% were female, and 3.0% chose not to disclose their gender. The predominance of male respondents in this study highlights a potential skew in the data, which may reflect broader societal gender dynamics or a gendered approach to participation in community-based conservation efforts. While the majority male representation provides a robust insight into the male perspective, the smaller female representation suggests the need for further efforts to engage women more actively in conservation activities and community partnerships. The relatively small percentage of individuals who preferred not to disclose their gender indicates that most respondents were comfortable with identifying their gender, although some individuals may still have felt the need for privacy.

Table 1: Gender distributions of respondents

Demographic Category	frequency	Percentage	Mean	Standard Deviation
Gender (Male)	40	59.7%	0.60	13.82
Gender (Female)	25	37.3%	0.37	13.82
Gender (Prefer not to say)	2	3.0%	0.03	13.82

Source: Field data (2024)

The age distribution of the respondents reveals a balanced spread across different age groups, with the largest proportion of respondents (29.9%) falling within the 26-35 age group, followed closely by those in the 36-45 age group (26.9%). The relatively young representation of respondents (ages 18-45 comprising over 75% of the sample) suggests that the findings likely reflect the perspectives of individuals who are actively engaged in the workforce or educational pursuits. These age groups are generally more open to new ideas, technological innovations, and social changes, which are essential for the adoption of new conservation strategies. The inclusion of older age groups, though smaller in number, provides valuable perspectives that offer historical context and long-term views on conservation issues. The diversity of age groups in the study allows for a broader understanding of how different generations experience and engage with de-snaring efforts and other conservation practices.

Table 2: Age distribution of respondents

Age Group	frequency	Percentage	Mean	Standard Deviation
18-25	15	22.4%	0.22	6.81
26-35	20	29.9%	0.30	6.81
36-45	18	26.9%	0.27	6.81
46-55	9	13.4%	0.13	6.81
56+	5	7.5%	0.07	6.81

Source: Field data (2024)

The educational background of the respondents reflects a range of formal education levels, with the largest group (37.3%) holding diploma or certificate qualifications. This group is followed by those with secondary education (29.9%), and a smaller proportion having bachelor's degrees (11.9%) or master's degrees (3%). The educational level of respondents has a direct impact on their ability to engage with the study's concepts and contribute to the discussions surrounding de-snaring efforts and anti-poaching strategies. Respondents with diploma and certificate qualifications, representing the largest proportion, are likely to have practical knowledge that can inform applied conservation strategies. In contrast, respondents with higher education qualifications may provide more analytical insights into the broader environmental and policy implications of conservation efforts. The diversity in education levels suggests that the study captured a wide range of perspectives, from those with practical, hands-on experience to those with theoretical or academic backgrounds.

Table 3: Education distribution of respondents

Education Level	Frequency	Percentage	Mean	Standard Deviation
Primary or below	12	17.9%	0.18	5.57
Secondary	20	29.9%	0.30	5.57
Diploma/Certificate	25	37.3%	0.37	5.57
Bachelor's	8	11.9%	0.12	5.57
Master's or higher	2	3.0%	0.03	5.57
Total	**67**	**100%**		

Source: Field data (2024)

The respondents' occupations reveal a wide array of professional backgrounds, with farmers representing the largest group (29.9%), followed by students (17.9%), businesspersons (22.4%), and smaller proportions of government employees (14.9%) and NGO workers (7.5%). The

predominance of farmers reflects the rural context of the study, where agriculture is a primary source of livelihood. This is particularly relevant when considering how conservation practices, such as de-snaring, impact local communities whose livelihoods are closely tied to the land and its resources. The inclusion of students provides insight into the younger generation's engagement with conservation issues, while businesspersons offer perspectives from the local economy and entrepreneurship. The smaller proportions of government employees and NGO workers highlight the roles of formal institutions and development organizations in supporting conservation efforts. Understanding the occupational diversity of respondents is critical for analyzing how different professional groups contribute to or are affected by conservation initiatives.

Table 4: The occupation distribution of respondents

Occupation	frequency	Percentage	Mean	Standard Deviation
Farmer	20	29.9%	0.30	8.16
Student	12	17.9%	0.18	8.16
Businessperson	15	22.4%	0.22	8.16
Government Employee	10	14.9%	0.15	8.16
NGO Worker	5	7.5%	0.07	8.16
Other	5	7.5%	0.07	8.16

Source: Field data (2024)

Various snaring techniques used by poachers in wildlife poaching within Serengeti National Park This study aimed to investigate the techniques employed by poachers in wildlife poaching within Serengeti National Park, with a particular focus on the methods used to target wildebeests. Among these methods, snaring stands out as one of the most pervasive and destructive techniques due to its affordability, ease of deployment, and effectiveness in trapping a wide variety of wildlife species. Understanding these techniques is critical for devising strategies to mitigate poaching and preserve the Serengeti's biodiversity. To achieve this objective, the study posed several key questions to gather insights into poaching practices, contributing factors, and potential deterrents. 4.1.1 Familiarity with techniques used by poachers. Understanding the familiarity of local communities, park authorities, and stakeholders with the techniques used by poachers is a crucial step in addressing wildlife poaching in Serengeti National Park.

Familiarity with techniques used by poachers

The study categorized the 67 respondents into three levels of familiarity with poaching techniques: Very Familiar, Somewhat Familiar, and Not Familiar at All. These categories provide insights into the awareness and knowledge of different groups about poaching practices in the Serengeti National Park. The largest portion of respondents, 52% (35 individuals), reported being Somewhat Familiar with poaching techniques. This indicates that while they possess a general understanding of the methods used by poachers, their knowledge may lack depth or direct experience. This group is significant because they represent a population that could greatly benefit from enhanced educational initiatives and awareness campaigns. Strengthening their knowledge could empower them to play a more active role in identifying and combating poaching activities.

A notable 30% (20 individuals) of respondents indicated being Very Familiar with poaching techniques. This group likely includes individuals with direct exposure or experience, such as local community members near the park, park rangers, or conservation workers. Their familiarity positions them as valuable allies in anti-poaching efforts. Their insights and expertise can be leveraged for monitoring, incident reporting, and educating others about identifying signs of

poaching. The remaining 18% (12 individuals) reported being Not Familiar at All with poaching techniques. This lack of awareness highlights a gap in outreach or educational efforts within certain communities. Increasing awareness within this group is essential, as even basic knowledge about poaching methods can promote broader community participation in wildlife conservation and protection efforts.

These findings underscore the need for targeted interventions to enhance familiarity levels. The "Very Familiar" group can serve as community champions, helping to train and mentor others. Meanwhile, educational campaigns should prioritize engaging the "Somewhat Familiar" and "Not Familiar at All" groups to build a more informed and proactive community. By improving familiarity across all groups, conservation authorities can strengthen collective efforts to detect, report, and prevent poaching in the Serengeti National Park.

Table 5: Levels of Familiarity with Poaching Techniques

Familiarity Level	Number of Respondents	Percentage (%)	Description
Very Familiar	20	30%	Direct exposure or experience, including rangers and conservation workers.
Somewhat Familiar	35	52%	General understanding but lacking in-depth knowledge or direct experience.
Not Familiar at All	12	18%	No knowledge or awareness of poaching techniques.

Commonly used techniques by poachers

Poaching remains a significant threat to wildlife conservation efforts, particularly in biodiversity-rich areas like Serengeti National Park. Poachers employ a range of techniques to capture or kill wildlife, targeting species for meat, trophies, and other valuable products. These techniques are often adapted to the environment and species targeted, making them effective but highly detrimental to ecosystems. Basing on this reason it was the interest of the researcher to examine which is frequently used methods among snaring, shooting, poisoning water sources, and trapping. By identifying and analyzing these methods, conservationists and authorities can develop strategies to address the specific challenges posed by each technique, ultimately contributing to the preservation of endangered species and the protection of ecosystems. This study explores these techniques to provide actionable insights for combating wildlife poaching.

The pie chart provides a visual representation of the most commonly used poaching techniques in Serengeti National Park, as identified by 67 respondents. These techniques—snaring, shooting, trapping, and poisoning water sources—are employed by poachers based on their effectiveness, ease of use, and target species. The chart illustrates the relative prevalence of each technique, shedding light on the methods that pose the greatest threats to wildlife conservation.

Snaring was identified as the most frequently used technique, accounting for 38.5% of the responses. This method is widely favored by poachers due to its simplicity, low cost, and ability to operate passively without constant monitoring. Snares are often set along wildlife trails or near water sources, exploiting the predictable movement patterns of animals. While effective, snaring is highly indiscriminate, capturing non-target species, including endangered animals. Its widespread use highlights the urgent need for regular snare removal campaigns and community awareness programs to reduce its impact.

Shooting was the second most common technique, mentioned by 30.8% of respondents. This method is often used for high-value species such as elephants and rhinos, where specific body parts like tusks or horns are harvested. Shooting requires more resources, including firearms and ammunition, making it a more targeted method compared to snaring. However, it is also more detectable due to the noise generated by gunfire, which can alert authorities. Despite this, the effectiveness of shooting in targeting large, high-value animals makes it a significant threat to wildlife conservation. Trapping, identified by 23.1% of respondents, involves using baited or unbaited devices to capture animals. Like snaring, it is cost-effective and can target a variety of species. However, it also shares the indiscriminate nature of snares, often harming non-target species and causing severe injuries or prolonged suffering for captured animals. The use of traps further underscores the need for vigilance and proactive measures, such as training anti-poaching units to identify and dismantle these devices.

Table 6: Poaching techniques

Poaching Technique	Number of Respondents	Percentage (%)	Description
Snaring	26	38.50%	Simple, low-cost method; indiscriminately captures animals along trails/water sources.
Shooting	21	30.80%	Targets high-value species (e.g., elephants, rhinos); requires firearms and ammunition.
Trapping	15	23.10%	Cost-effective; baited/unbaited traps capture various species, often indiscriminately.
Poisoning Water Sources	5	7.70%	Contaminates water sources; potential for mass fatalities affecting wildlife and humans.

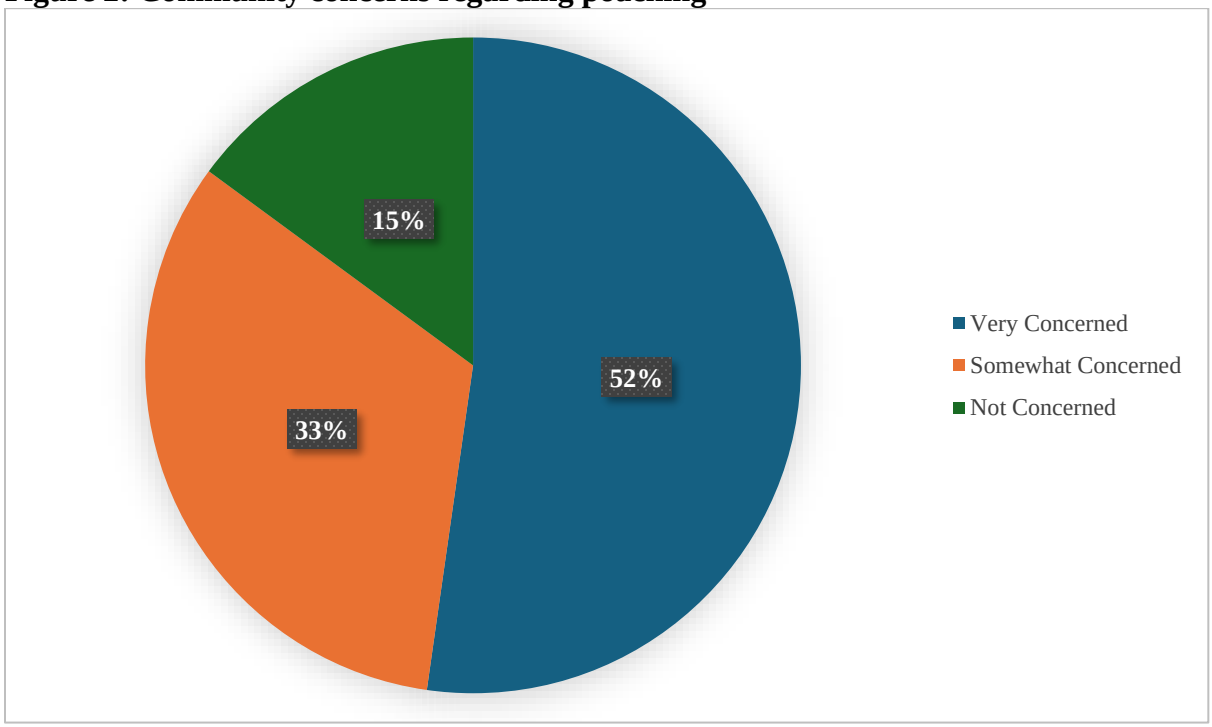
Poisoning water sources, while the least reported technique (7.7%), is particularly destructive. This method involves contaminating water bodies to kill multiple animals that consume the poisoned water. Although less frequently employed, its potential for mass fatalities makes it a critical concern. Poisoning not only affects wildlife but also poses risks to humans and livestock, highlighting its far-reaching consequences. Rapid response measures to detect and mitigate poisoning incidents are essential for minimizing its impact. The findings from the chart reveal the diverse strategies employed by poachers, with snaring and shooting emerging as the most prevalent techniques. Trapping and poisoning, although less common, remain significant threats due to their potential for indiscriminate and large-scale harm. Addressing these issues requires targeted interventions tailored to each technique. Enhanced surveillance, stricter enforcement of anti-poaching laws, community engagement, and the promotion of alternative livelihoods for at-risk populations are critical components of any effective conservation strategy.

Community's level of concern regarding poaching activities

The pie chart illustrates the distribution of respondents' concerns regarding poaching activities in SENAPA (likely a wildlife conservation area). The data reveals varying levels of concern among the respondents, with the majority expressing significant apprehension about the issue. A substantial 52.2% of respondents indicated that they are very concerned about poaching activities in SENAPA, highlighting a strong awareness and concern for the potential impacts of illegal hunting on the area's wildlife and ecosystem. This majority suggests that a significant portion of the population views poaching as a serious threat to conservation efforts and the sustainability of the protected area.

Additionally, 32.8% of respondents fall into the somewhat concerned category. While not as strongly worried as those in the "very concerned" group, this segment still expresses a notable level of concern about poaching, signaling that the issue is of considerable importance to them, albeit with slightly less urgency. On the other hand, only 14.9% of respondents stated that they are not concerned about poaching activities in SENAPA. This represents a relatively small minority, indicating that most people recognize the risks posed by poaching, regardless of the degree of concern they feel.

Figure 2: Community concerns regarding poaching

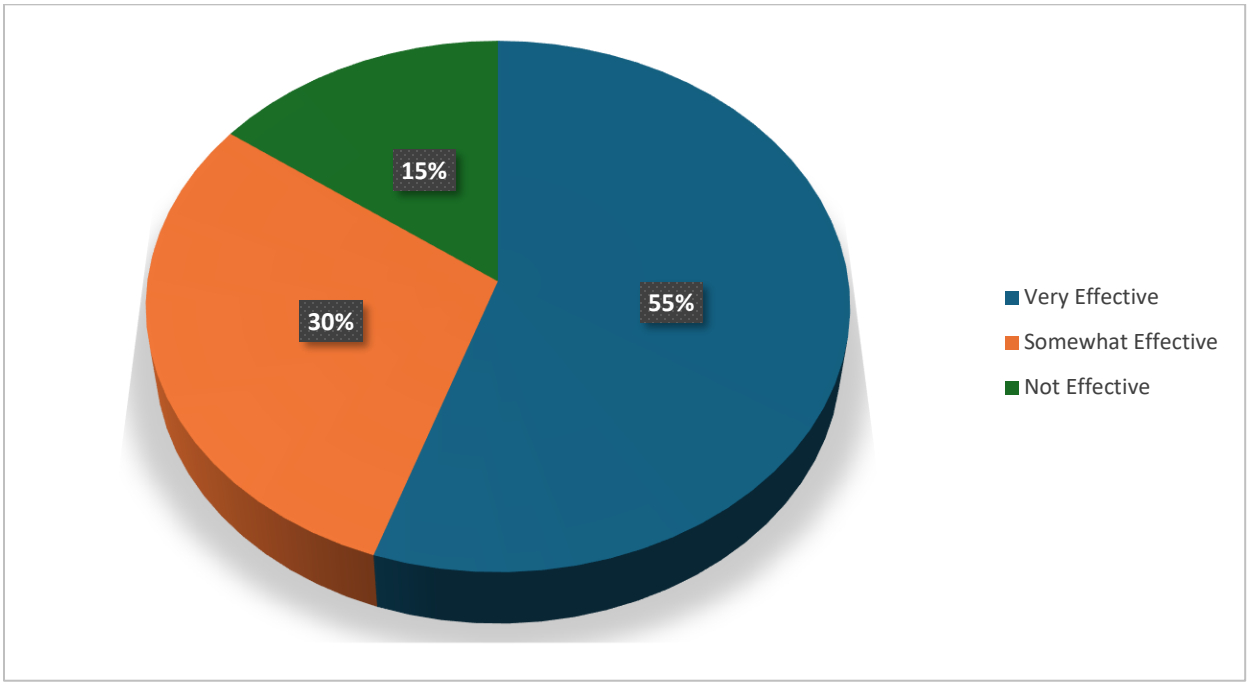


Source: Field data (2024)

How effective do you think current anti-poaching measures are in SENAPA

The perceptions of respondents regarding the effectiveness of current anti-poaching measures in SENAPA (Serengeti National Park) are categorized into three groups: Very Effective, Somewhat Effective, and Not Effective. These categories provide valuable insights into how individuals familiar with the area view the ongoing conservation efforts aimed at protecting wildlife. The data reveals a spectrum of confidence levels in these strategies, reflecting both the successes and the challenges faced by conservation authorities. A significant 55% of respondents believe that the anti-poaching measures in SENAPA are very effective. This positive assessment suggests that the majority are confident in the current strategies, which likely include increased patrolling, technological monitoring, and strengthened law enforcement. These measures are perceived as playing a crucial role in protecting endangered species and maintaining the park's ecological balance. The confidence expressed by this group highlights the importance of sustained efforts to combat poaching and the value of continuous investment in anti-poaching infrastructure and operations.

Figure 3: Effectiveness of antipoaching



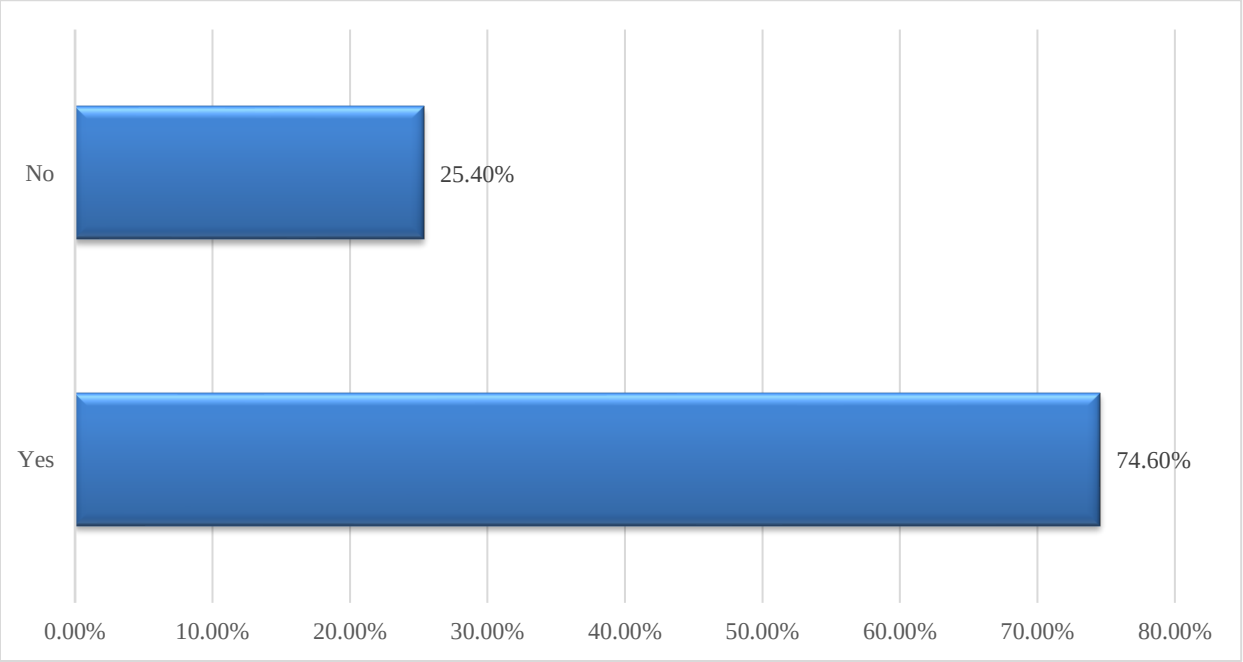
On the other hand, 30% of respondents consider the anti-poaching measures to be somewhat effective. This group acknowledges the progress made but recognizes that challenges persist. Factors contributing to this perception may include resource limitations, the persistence of poaching in remote or hard-to-reach areas, or a lack of comprehensive community engagement. Respondents in this category may feel that while some strategies work well, the overall approach needs enhancement to achieve consistent and widespread success. Their feedback underscores the need for ongoing improvements and adaptations in anti-poaching strategies. Finally, 15% of respondents believe the anti-poaching measures are not effective. This group expresses concerns that the current strategies are insufficient in deterring poaching. Issues such as weak enforcement, corruption, or inadequate community involvement may contribute to their lack of confidence. Their perspective highlights the need for addressing systemic challenges, improving enforcement mechanisms, and ensuring community-based participation in conservation efforts. These concerns point to areas where policy adjustments and increased resources may be necessary to strengthen the effectiveness of anti-poaching interventions.

Awareness of the de-snaring efforts conducted by SENAPA

The de-snaring efforts conducted by SENAPA (Serengeti National Park) play a crucial role in protecting wildlife from the dangers posed by illegal poaching activities, particularly the use of snares to capture animals. Understanding the level of awareness surrounding these de-snaring efforts is vital for evaluating the success of conservation initiatives in SENAPA. Awareness of such efforts not only reflects the level of engagement from local communities, park staff, and other stakeholders but also serves as an indicator of the program's reach and effectiveness. This study aims to explore the awareness of de-snaring efforts conducted by SENAPA, examining how well stakeholders understand these initiatives and their role in supporting wildlife protection. Through this, the study will contribute to assessing the effectiveness of current communication strategies

and suggest potential improvements to enhance the reach and impact of de-snaring efforts in the park.

Figure 4: Awareness on de-snaring efforts



The pie chart illustrates the level of awareness regarding the de-snaring efforts conducted by SENAPA (Serengeti National Park). The chart divides respondents into two categories: those who are aware and those who are not aware of these conservation initiatives. A significant majority, 74.6%, of respondents indicated that they are aware of the de-snaring efforts. This suggests that a large portion of the population is informed about the measures being taken by SENAPA to combat the issue of snares, which are often used by poachers to trap wildlife. The high level of awareness could reflect the effectiveness of communication strategies employed by SENAPA, including outreach programs, community engagement, and the visibility of anti-poaching efforts within the park. This level of awareness is crucial because it indicates that the community is likely more supportive and involved in these conservation efforts, which is essential for the long-term success of such initiatives.

However, 25.4% of respondents reported that they are not aware of the de-snaring efforts. While this percentage is smaller, it still represents a significant portion of the population. This lack of awareness could be attributed to gaps in communication, limited outreach in certain areas, or insufficient dissemination of information regarding the importance of de-snaring activities. This group of respondents may not have access to relevant information or may not be directly engaged in conservation efforts. The discussion of the major findings is centered around the research objectives, which were aimed at understanding the effectiveness of current conservation efforts in SENAPA, particularly focusing on the cooperation between local communities and de-snaring teams. The research objectives were to assess the level of awareness about de-snaring efforts, evaluate the cooperation between local communities and de-snaring teams, and determine the perceived effectiveness of anti-poaching measures in the region.

Discussion

The results of this study provide critical insights into the snaring techniques employed by poachers, the familiarity of local communities with poaching methods, and the effectiveness of current anti-poaching measures in Serengeti National Park (SENAPA). These findings highlight the need for strategic interventions and community involvement to address the ongoing poaching crisis. Each aspect contributes to a broader understanding of the challenges and potential solutions for wildlife conservation.

The study revealed that the majority of respondents (52%) are "Somewhat Familiar" with poaching techniques. This finding underscores the general awareness among local communities of the methods used by poachers, such as snaring, shooting, and trapping. However, as highlighted by Mwangomo and Ndesanjo (2023), this familiarity often lacks depth or direct experience, pointing to the need for targeted educational programs to enhance knowledge. The 30% of respondents who reported being "Very Familiar" likely include individuals actively involved in conservation, such as park rangers and residents living near the park. Their insights are invaluable for strengthening anti-poaching measures. Conversely, the 18% who are "Not Familiar at All" indicate a gap in outreach efforts, especially in remote regions, emphasizing the importance of improving educational campaigns.

The analysis of poaching techniques showed that snaring is the most frequently used method, reported by 38.5% of respondents. This result aligns with previous research by Mwangomo and Ndesanjo (2023), who noted that snaring is popular due to its simplicity, low cost, and passive nature. Unfortunately, its indiscriminate nature leads to the capture of both target and non-target species, including endangered wildlife. Shooting was the second most common method, cited by 30.8% of respondents. This technique, primarily targeting high-value species like elephants and rhinos, presents significant conservation challenges despite being more detectable due to noise. Trapping accounted for 23.1%, while poisoning water sources was the least common technique at 7.7%, though its destructive potential remains a critical concern. These findings highlight the urgent need for tailored strategies to combat each poaching method effectively.

Community perceptions toward poaching activities are crucial in shaping conservation strategies. The study found that 52.2% of respondents are "Very Concerned" about poaching, reflecting a high level of awareness of its detrimental effects on biodiversity and ecosystems. This concern is consistent with findings by Botha and Van der Merwe (2022) in South Africa, where poaching directly impacts local wildlife. Meanwhile, 32.8% of respondents are "Somewhat Concerned", indicating that while they recognize the issue, their sense of urgency is slightly less pronounced. Only 14.9% expressed being "Not Concerned", suggesting that poaching is broadly acknowledged as a serious threat. These perceptions underscore the importance of community-driven conservation initiatives to engage residents actively in wildlife protection efforts.

The study assessed the effectiveness of current anti-poaching measures in SENAPA, with 55% of respondents rating them as "Very Effective". This positive perception likely reflects successful strategies such as increased patrolling, advanced technology for monitoring, and de-snaring operations. However, 30% of respondents deemed these measures "Somewhat Effective", suggesting room for improvement. Issues such as resource constraints and limited geographic

coverage may hinder their full potential. Additionally, 15% of respondents rated the measures as "Not Effective", pointing to weaknesses like weak enforcement and lack of community involvement. These findings highlight the need to enhance current efforts by addressing these challenges and ensuring community participation.

The role of the community in reducing poaching activities is critical for the success of conservation strategies. Many respondents expressed strong support for community-based de-snaring efforts, aligning with the recommendations by Moyo and Chikwanha (2023). Involving local populations in identifying and removing snares not only reduces poaching but also fosters a sense of ownership and responsibility. Effective community engagement ensures that conservation efforts are sustainable and widely supported. This approach can be further strengthened by offering educational programs and alternative livelihoods, empowering communities to play an active role in protecting wildlife.

Despite the successes of de-snaring initiatives, several obstacles hinder their effectiveness. These include insufficient funding, logistical challenges, limited resources, and a lack of advanced technology. As noted by Mkhize and Ndlovu (2023), these challenges make it difficult to monitor vast protected areas effectively. The study revealed that 74.6% of respondents are aware of de-snaring efforts, suggesting successful outreach. However, the 25.4% who are unaware highlight the need for improved communication strategies, particularly in remote areas. Addressing these obstacles through increased investment in technology, enhanced law enforcement, and community-based programs is essential for the long-term success of de-snaring efforts.

The study found generally positive cooperation between local communities and de-snaring teams, with 40% rating it as "Excellent" and 35% as "Good". However, challenges remain, as 15% rated cooperation as "Fair" and 10% as "Poor". These issues could stem from misunderstandings, insufficient involvement, or lack of training. To improve cooperation, it is crucial to involve communities in the planning and execution of de-snaring efforts, provide clear communication about the benefits, and offer incentives for participation. By addressing these challenges, conservation authorities can enhance the effectiveness of anti-poaching initiatives and foster stronger community support for wildlife conservation in SENAPA.

Conclusion

This study highlights the ongoing challenges posed by poaching activities in Serengeti National Park (SENAPA) and provides valuable insights into community perceptions, familiarity with poaching techniques, and the effectiveness of anti-poaching measures. The findings indicate that while significant strides have been made in combating poaching, there are still considerable gaps that need to be addressed to ensure the long-term preservation of the park's biodiversity. Snaring was identified as the most frequently used poaching technique, followed by shooting, trapping, and poisoning water sources. These methods not only endanger wildlife but also have far-reaching ecological consequences, underscoring the critical need for targeted interventions.

Anti-poaching measures in SENAPA were generally rated positively by respondents, with many recognizing their effectiveness. However, a substantial portion of respondents identified areas for improvement, including resource constraints, insufficient community involvement, and limitations in geographic coverage. The high levels of concern about poaching among community members

reflect their willingness to engage in conservation efforts, which can be leveraged to strengthen anti-poaching strategies. However, the findings also reveal obstacles such as weak enforcement and community resistance that need to be addressed to ensure sustainable success.

To address these issues, enhancing community education and engagement is crucial. Targeted awareness campaigns and training programs should be implemented to increase community knowledge of poaching techniques and the ecological impacts of poaching. These efforts should particularly focus on individuals who are "Not Familiar" with poaching methods, ensuring that remote and underserved areas are reached. Regular de-snaring operations should be scaled up to reduce the impact of snaring, which is the most prevalent poaching technique. Community involvement in de-snaring efforts should be prioritized to foster a sense of ownership and responsibility among local residents. Incentives for community participation, such as alternative livelihoods, should also be provided to reduce reliance on poaching.

In addition, there is a need to invest more in advanced technologies such as drones, GPS-enabled monitoring systems, and camera traps to improve the efficiency of anti-poaching operations. These tools can help overcome logistical challenges, particularly in hard-to-reach areas of the park. Adequate funding and training for the use of these technologies are essential to ensure their successful implementation. Strengthening law enforcement mechanisms is also critical, including increasing the number of trained rangers, providing adequate resources, and ensuring strict penalties for those involved in poaching. Cooperation with legal and judicial systems will ensure that offenders are prosecuted effectively, reinforcing the deterrent effect of anti-poaching measures.

Finally, fostering long-term cooperation between conservation authorities and local communities is essential for the success of anti-poaching strategies. This can be achieved through regular consultations, involving communities in decision-making processes, and providing tangible benefits, such as employment opportunities or revenue-sharing schemes, from conservation initiatives. By addressing these challenges and strengthening community engagement, SENAPA can build a robust framework for protecting its rich biodiversity and ensuring the sustainability of the park’s ecosystem for future generations.

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